Journal of Cell Science

Volume 103 1992

Editors

FIONA M. WATT
GARY BORISY
DANIEL LOUVARD

Editorial Board

Anthony Bretscher (Ithaca)
David A. Cheresh (La Jolla)
Roland Douce (Grenoble)
William C. Earnshaw (Baltimore)
Benny Geiger (Rehovot)
David M. Glover (Dundee)
Bruno Goud (Paris)
Kathleen J. Green (Chicago)
Nobutaka Hirokawa (Tokyo)
Alan F. Horwitz (Urbana)
Colin Hughes (London)
Tim Hunt (South Mimms)
Jeremy S. Hyams (London)
Eric Karsenti (Heidelberg)
David P. Lane (Dundee)
Ron Laskey (Cambridge)
Clive Lloyd (Norwich)
Tony Magee (London)
Frank McKeon (Boston)
Timothy J. Mitchison (San Francisco)
W. James Nelson (Stanford)
Peter C. Newell (Oxford)
John Newport (La Jolla)
Nicos A. Nicola (Melbourne)
Erich A. Nigg (Lausanne)
Angelika A. Noegel (Munich)
Alan Rapraeger (Madison)
Anita B. Roberts (Bethesda)
Enrique Rodriguez-Boulan (New York)
Ulrich Scheer (Würzburg)
Erik S. Schweitzer (Los Angeles)
David L. Spector (Cold Spring Harbor)
Jean-Paul Thiery (Paris)
Rupert Timpl (Munich)
Shoichiro Tsukita (Okazaki)
Graham Warren (London)
Paul M. Wassarman (Nutley)
Klaus Weber (Göttingen)
Kenneth M. Yamada (Bethesda)
Mitsuhiro Yanagida (Kyoto)

Publisher

The Company of Biologists Limited, founded in 1925, is a non-commercial organization having tax-exempt charitable status. There is a Board of Directors consisting of about 20 professional biologists, who receive no salary or fees for their services. The Company's main function is to own and manage *Development, Journal of Cell Science* and *The Journal of Experimental Biology*. It also publishes *BioEssays* for the ICSU Press. Any surplus on publishing not required for the journals' reserves is transferred to an Educational Trust Fund, which makes grants in aid of societies concerned with the fields of interest covered by the Company's journals. Grants are also made to conferences and summer schools in the fields of its journals.

Published by The Company of Biologists Limited, Cambridge

Typeset, Printed and Published by
The Company of Biologists Limited,
Department of Zoology, University of Cambridge, Downing Street,
Cambridge CB2 3EJ

© The Company of Biologists Limited 1992

Contents

Volume 103 1992

Commentaries

Watts, C. and Marsh, M.
Endocytosis: what goes in and how? 1-8

Lee, K. A. W.
Dimeric transcription factor families: it takes two to tango but who decides on partners and the venue? 9-14

Volkman, L. E., Talhouk, S. N., Oppenheimer, D. I. and Charlton, C. A.
Nuclear F-actin: a functional component of baculovirus-infected lepidopteran cells 15-22

Abbott, N. J., Hughes, C. C. W., Revest, P. A. and Greenwood, J.
Development and characterisation of a rat brain capillary endothelial culture: towards an in vitro blood-brain barrier 23-37

Stolz, D. B. and Jacobson, B. S.
Examination of transcellular membrane protein polarity of bovine aortic endothelial cells in vitro using the cationic colloidal silica microbead membrane isolation procedure 39-51

Stolz, D. B., Bannish, G. and Jacobson, B. S.
The role of the cytoskeleton and intercellular junctions in the transcellular membrane protein polarity of bovine aortic endothelial cells in vitro 53-68

Trevor, K. T. and Steben, L. S.
Distribution of desmosomal proteins in F9 embryonic carcinoma cells and epithelial cell derivatives 69-80

Risley, M. S., Tan, I. P., Roy, C. and Sáez, J. C.
Cell-, age- and stage-dependent distribution of connexin43 gap junctions in testes 81-96

Humbert, C., Satisteban, M. S., Usson, Y. and Robert-Nicoud, M.
Intranuclear co-location of newly replicated DNA and PCNA by simultaneous immunofluorescent labelling and confocal microscopy in MCF-7 cells 97-103

Sumner, A. T.
Inhibitors of topoisomerases do not block the passage of human lymphocyte chromosomes through mitosis 105-115

Ghosh, S., Paweletz, N. and Schroeter, D.
Effects of okadaic acid on mitotic HeLa cells 117-124

Leslie, R. J.
Chromosomes attain a metaphase position on half-spindles in the absence of an opposing spindle pole 125-130

Sato, N., Funayama, N., Nagafuchi, A., Yonemura, S., Tsukita, S. and Tsukita, S.
A gene family consisting of erzrin, radixin and moesin: its specific localization at actin filament/plasma membrane association sites 131-143

Lepidi, H., Benoliel, A.-M., Mege, J.-L., Bongrand, P. and Capo, C.
Double localization of F-actin in chemoattractant-stimulated polymorphonuclear leucocytes 145-156

Matesic, D. F., Philp, N. J., Murray, J. M. and Liebman, P. A.
Tubulin in bovine retinal rod outer segments 157-166

Trimbur, G. M. and Walsh, C. J.
BN46/51, a new nucleolar protein, binds to the basal body region in *Naegleria gruberi* flagellates 167-181

Williams, D. S., Hallet, M. A. and Arikawa, K.
Association of myosin with the connecting cilium of rod photoreceptors 183-190

Baluška, F., Parker, J. S. and Barlow, P. W.
Specific patterns of cortical and endoplasmic microtubules associated with cell growth and tissue differentiation in roots of maize (*Zea mays* L.) 191-200

Swanson, J. A., Locke, A., Ansel, P. and Hollenbeck, P. J.
Radial movement of lysosomes along microtubules in permeabilized macrophages 201-209

Killisch, I., Steinlein, P., Römisch, K., Hollinshead, R., Beug, H. and Griffiths, G.
Characterization of early and late endocytic compartments of the transferrin cycle: transferrin receptor antibody blocks erythroid differentiation by trapping the receptor in the early endosome 211-232

Meyerson, G., Pfenninger, K. H. and Påhlman, S.
A complex consisting of $pp60^{c\text{-}src}$/$pp60^{c\text{-}srcN}$ and a 38 kDA protein is highly enriched in growth cones from differentiated SH-SY5Y neuroblastoma cells 233-243

TenBroek, E., Arneson, M., Jarvis, J. and Louis, C.
The distribution of the fiber cell intrinsic membrane proteins MP20 and connexin46 in the bovine lens 245-257

Sung, K.-L. P., Kuhlman, P., Maldonado, F., Lollo, B. A., Chien , S. and Brian, A. A.
Force contribution of the LFA-1/CAM-1 complex to T cell adhesion 259-266

Clover, J., Dodds, R. A. and Gowen, M.
Integrin subunit expression by human osteoblasts and osteoclasts *in situ* and in culture 267-271

Zylberberg, L., Bonaventure, J., Cohen-Solal, L., Hartmann, D. J. and Bereiter-Hahn, J.
Organization and characterization of fibrillar collagens in fish scales in situ and in vitro 273-285

Clark, P., Connolly, P. and Moores, G. R.
Cell guidance by micropatterned adhesiveness *in vitro* 287-292

Commentaries

Underhill, C.
CD44: The hyaluronan receptor 293-298

Contents

Carraway, K. L., Fregien, N., Carraway, K. L. III and Carraway, C. A. C.
Tumor sialomucin complexes as tumor antigens and modulators of cellular interactions and proliferation 299-307

Henson, J. H., Nesbitt, D., Wright, B. D. and Scholey, J. M.
Immunolocalization of kinesin in sea urchin coelomocytes: Association of kinesin with intracellular organelles 309-320

Lahtinen, U., Dahllöf, B. and Saraste, J.
Characterization of a 58 kDa *cis*-Golgi protein in pancreatic exocrine cells 321-333

Parton, R. G., Schrotz, P., Bucci, C. and Gruenberg, J.
Plasticity of early endosomes 335-348

Shih, S.-J. and Nelson, D. L.
Proteolytic processing of secretory proteins in *Paramecium*: immunological and biochemical characterization of the precursors of trichocyst matrix proteins 349-361

Brodsky, V. Y., Boikov, P. Y., Nechaeva, N. V., Yurovitsky, Y. G., Novikova, T. E., Fateeva, V. I. and Schevchenko, N. A.
The rhythm of protein synthesis does not depend on oscillations of ATP level 363-370

Coukell, M. B., Cameron, A. M. and Adames, N. R.
Involvement of intracellular calcium in protein secretion in *Dictyostelium discoideum* 371-380

Warren, S. L., Landolfi, A. S., Curtis, C. and Morrow, J. S.
Cytostellin: a novel, highly conserved protein that undergoes continuous redistribution during the cell cycle 381-388

Vincent, C., Cheek, T. R. and Johnson, M. H.
Cell cycle progression of parthenogenetically activated mouse oocytes to interphase is dependent on the level of internal calcium 389-396

Katsuta, J. and Shibaoka, H.
Inhibition by kinase inhibitors of the development and the disappearance of the preprophase band of microtubules in tobacco BY-2 cells 397-405

McNulty, A. K. and Saunders, M. J.
Purification and immunological detection of pea nuclear intermediate filaments: evidence for plant nuclear lamins 407-414

Jenkins, G. and Okumus, A.
Indiscriminate synapsis in achiasmate *Allium fistulosum* L. (Liliaceae) 415-422

Mardon, H. J. and Sebastio, G.
Regulation of alternative splicing in the IIICS region of human fibronectin pre-mRNA encoding cell binding sites CS1 and CS5 423-433

Aplin, J. D., Sattar, A. and Mould, A. P.
Variant choriocarcinoma (BeWo) cells that differ in adhesion and migration on fibronectin display conserved patterns of integrin expression 435-444

Kielty, C. M., Whittaker, S. P., Grant, M. E. and Shuttleworth, C. A.
Attachment of human vascular smooth muscle cells to intact microfibrillar assemblies of collagen VI and fibrillin 445-451

Swinscoe, J. C. and Carlson, E. C.
Capillary endothelial cells secrete a heparin-binding mitogen for pericytes 453-461

Bogner, P., Skehan, P., Kenney, S., Sainz, E. and Friedman, S. J.
Stabilization of intercellular contacts in MDCK cells during Ca^{2+} deprivation. Selective effects of monocarboxylic acids on desmosomes 463-473

Riddelle, K. S., Hopkinson, S. B. and Jones, J. C. R.
Hemidesmosomes in the epithelial cell line 804G: their fate during wound closure, mitosis and drug induced reorganization of the cytoskeleton 475-490

Truskey, G. A., Burmeister, J. S., Grapa, E. and Reichert, W. M.
Total internal reflection fluorescence microscopy (TIRFM). II. Topographical mapping of relative cell/substratum separation distances 491-499

Grunt, Th. W., Somay, C., Oeller, H., Dittrich, E. and Dittrich, Ch.
Comparative analysis of the effects of dimethyl sulfoxide and retinoic acid on the antigenic pattern of human ovarian adenocarcinoma cells 501-509

Fukamachi, H.
Proliferation and differentiation of fetal rat intestinal epithelial cells in primary serum-free culture 511-519

Arciniegas, E., Sutton, A. B., Ellen, T. D. and Schor, A. M.
Transforming growth factor beta 1 promotes the differentiation of endothelial cells into smooth muscle-like cells in vitro 521-529

Gherardi, E., Thomas, K., Le Cras, T. D., Fitzsimmons, C., Moorby, C. D. and Bowyer, D. E.
Growth requirements and expression of LDL receptor and HMG-CoA reductase in Hep G2 hepatoblastoma cells cultured in a chemically defined medium 531-539

Moorby, C. D., Gherardi, E., Riddell, D. and Bowyer, D. E.
Porcine smooth muscle cell-conditioned medium stimulates LDL receptor activity in Hep G2 cells 541-549

Peng, H. B. and Chen, Q.
Induction of dystrophin localization in cultured *Xenopus* muscle cells by latex beads 551-563

Leick, V.
Chemotactic properties, cellular binding and uptake of peptides and peptide derivatives: Studies with *Tetrahymena thermophila* 565-570

Fawcett, J. W., Fersht, N., Housden, L., Schachner, M. and Pesheva, P.
Axonal growth on astrocytes is not inhibited by oligodendrocytes 571-579

Baroffio, A. and Blot, M.
Statistical evidence for a random commitment of pluripotent cephalic neural crest cells 581-587

Dahlstrand, J., Zimmerman, L. B., McKay, R. D. G. and Lendahl, U.
Characterization of the human nestin gene reveals a close evolutionary relationship to neurofilaments 589-597

Commentaries

Doonan, J. H.
Cell division in *Aspergillus* 599-611

Plattner, H., Knoll, G. and Erxleben, C.
The mechanics of biological membrane fusion. Merger of aspects from electron microscopy and patch-clamp analysis 613-618

Chen, M. S., Burgess, C. C., Vallee, R. B. and Wadsworth, S. C.
Developmental stage- and tissue-specific expression of *shibire*, a *Drosophila* gene involved in endocytosis 619-628

Hoey, J. G. and Gavin, R. H.
Localization of actin in the *Tetrahymena* basal body-cage complex 629-641

Jiang, Y. Q. and Oblinger, M. M.
Differential regulation of β_{III} and other tubulin genes during peripheral and central neuron development 643-651

Kagami, O. and Kamiya, R.
Translocation and rotation of microtubules caused by multiple species of *Chlamydomonas* inner-arm dynein 653-664

Woods, A., Baines, A. J. and Gull, K.
A high molecular mass phosphoprotein defined by a novel monoclonal antibody is closely associated with the intermicrotubule cross bridges in the *Trypanosoma brucei* cytoskeleton 665-675

Ojakian, G. K. and Schwimmer, R.
Antimicrotubule drugs inhibit the polarized insertion of an intracellular glycoprotein pool into the apical membrane of Madin-Darby canine kidney (MDCK) cells 677-687

Coleman, T. R. and Lazarides, E.
Continuous growth of vimentin filaments in mouse fibroblasts 689-698

Heusser, S., Colin, S., Figiel, A., Huet, C., Keller, J. M., Pornet, P., Robine, S., Vandamme, J., Vandekerckhove, J. and Dauça, M.
Amphibian intestinal villin: isolation and expression during embryonic and larval development 699-708

Brunkener, M. and Georgatos, S. D.
Membrane-binding properties of filensin, a cytoskeletal protein of the lens fiber cells 709-718

Gilmore, A. P., Jackson, P., Waites, G. T. and Critchley, D. R.
Further characterisation of the talin-binding site in the cytoskeletal protein vinculin 719-731

Thiel, C., Osborn, M. and Gerke, V.
The tight association of the tyrosine kinase substrate annexin II with the submembranous cytoskeleton depends on intact p11- and Ca^{2+}-binding sites 733-742

Kim, L. T., Ishihara, S., Lee, C.-C., Akiyama, S. K., Yamada, K. M. and Grinnell, F.
Altered glycosylation and cell surface expression of β_1 integrin receptors during keratinocyte activation 743-753

Kaur, P. and Carter, W. G.
Integrin expression and differentiation in transformed human epidermal cells is regulated by fibroblasts 755-763

Mackie, E. J. and Tucker, R. P.
Tenascin in bone morphogenesis: expression by osteoblasts and cell type-specific expression of splice variants 765-771

Cluett, E. B. and Brown, W. J.
Adhesion of Golgi cisternae by proteinaceous interactions: intercisternal bridges as putative adhesive structures 773-784

Antony, C., Cibert, C., Géraud, G., Santa Maria, A., Maro, B., Mayau, V. and Goud, B.
The small GTP-binding protein rab6p is distributed from medial Golgi to the *trans*-Golgi network as determined by a confocal microscopic approach 785-796

Barton, N. R., Bonder, E. M., Fishkind, D. J., Warren, R. H. and Pratt, M. M.
A novel vesicle-associated protein (VAP-1) in sea urchin eggs containing multiple RNA-binding consensus sequences 797-809

Zachgo, S., Dobberstein, B. and Griffiths, G.
A block in degradation of MHC class II-associated invariant chain correlates with a reduction in transport from endosome carrier vesicles to the prelysosome compartment 811-822

Furlong, S. T., Thibault, K. S. and Rogers, R. A.
Fluorecent phospholipids preferentially accumulate in sub-tegumental cells of *Schistosoma mansoni* 823-830

Suzuki, T., Kawano, S., Sakai, A., Fujie, M., Kuroiwa, H., Nakamura, H. and Kuroiwa, T.
Preferential mitochondrial and plastid DNA synthesis before multiple cell divisions in *Nicotiana tabacum* 831-837

Jeun, G. and Locke, M.
The relative positions of condensed chromosomes are maintained between divisions in the epidermis of *Calpodes ethlius* 839-846

Oud, J. L. and Nanninga, N.
Cell shape, chromosome orientation and the position of the plane of division in *Vicia faba* root cortex cells 847-855

Manders, E. M. M., Stap, J., Brakenhoff, G. J., van Driel, R. and Aten, J. A.
Dynamics of three-dimensional replication patterns during the S-phase, analysed by double labelling of DNA and confocal microscopy 857-862

Lourim, D. and Lin, J. J.-C.
Expression of wild-type and nuclear localization-deficient human lamin A in chick myogenic cells 863-874

Contents

Commentaries

Lucocq, J.
Mimicking mitotic Golgi division using okadaic acid 875-880

Clemens, M. J., Trayner, I. and Menaya, J.
The role of protein kinase C isoenzymes in the regulation of cell proliferation and differentiation 881-887

Zlatanova, J. and van Holde, K.
Histone H1 and transcription: still an enigma? 889-895

Mege, R. M., Goudou, D., Diaz, C., Nicolet, M., Garcia, L., Geraud, G. and Rieger, F.
N-cadherin and N-CAM in myoblast fusion: compared localisation and effect of blockade by peptides and antibodies 897-906

Sanchez, J. A., Marek, D. and Wangh, L. J.
The efficiency and timing of plasmid DNA replication in *Xenopus* eggs: correlations to the extent of prior chromatin assembly 907-918

Luke, S., Verma, R. S., Conte, R. A. and Mathews, T.
Molecular characterization of the secondary constriction region (qh) of human chromosome 9 with pericentric inversion 919-923

Carroll, J. M. and Taichman, L. B.
Characterization of the human involucrin promoter using a transient β-galactosidase assay 925-930

Cousin, B., Cinti, S., Morroni, M., Raimbault, S., Ricquier, D., Pénicaud, L. and Casteilla, L.
Occurrence of brown adipocytes in rat white adipose tissue: molecular and morphological characterization 931-942

Geiger, B., Salomon, D., Takeichi, M. and Hynes, R. O.
A chimeric N-cadherin/β_1-integrin receptor which localizes to both cell-cell and cell-matrix adhesions 943-951

Takemura, R., Okabe, S., Umeyama, T., Kanai, Y., Cown, N. J. and Hirokawa, N.
Increased microtubule stability and alpha tubulin acetylation in cells transfected with microtubule-associated proteins MAP1B, MAP2 or tau 953-964

Pryer, N. K., Walker, R. A., Skeen, V. P., Bourns, B. D., Soboeiro, M. F. and Salmon, E. D.
Brain microtubule-associated proteins modulate microtubule dynamic instability in vitro: real-time observations using video microscopy 965-976

Cleary, A. L., Gunning, B. E. S., Wasteneys, G. O. and Hepler, P. K.
Microtubule and F-actin dynamics at the division site in living *Tradescantia* stamen hair cells 977-988

Eleftheriou, E. P. and Palevitz, B. A.
The effect of cytochalasin D on preprophase band organization in root tip cells of *Allium* 989-998

Stephens, R. E. and Prior, G.
Dynein from serotonin-activated cilia and flagella: extraction characteristics and distinct sites for cAMP-dependent protein phosphorylation 999-1012

Hatsumi, M. and Endow, S. A.
The *Drosophila* ncd microtubule motor protein is spindle-associated in meiotic and mitotic cells 1013-1020

Lehner, C. R.
The *pebble* gene is required for cytokinesis in *Drosophila* 1021-1030

Brown, R. C. and Lemmon, B. E.
Control of division plane in normal and griseofulvin-treated microsporocytes of *Magnolia* 1031-1038

Rattner, J. B. and Wang, T.
Kinetochore formation and behaviour following premature chromosome condensation 1039-1045

Gonzalez-Fernandez, A., Sans, J., Aller, P. and de la Torre, C.
The involvement of discrete genome regions in post-mitotic chromosome decondensation and in G_1 timing in *Allium cepa* L. meristematic cells 1047-1051

Rodrigo, R. M., Rendón, M. C., Torreblanca, J., García-Herdugo, G. and Moreno, F. J.
Characterization and immunolocalization of RNA polymerase I transcription factor UBF with anti-NOR serum in protozoa, higher plant and vertebrate cells 1053-1063

Larsson, O. and Wejde, J.
Dolichol delays G_1-arrest for one cell cycle in human fibroblasts subjected to depletion of serum or mevalonate 1065-1072

von Zglinicki, T., Edwall, C., Östlund, E., Lind, B., Nordberg, M., Ringertz, N. R. and Wroblewski, J.
Very low cadmium concentrations stimulate DNA synthesis and cell growth 1073-1081

Angrand, P.-O., Rousset, J.-P. and Weiss, M. C.
Cell phenotype, binding affinity and promoter structure modulate transactivation by HNF1 and LAP 1083-1092

Meikle, M. C., Bord, S., Hembry, R. M., Compston, J., Croucher, P. I. and Reynolds, J. J.
Human osteoblasts in culture synthesize collagenase and other matrix metalloproteinases in response to osteotropic hormones and cytokines 1093-1099

Poole, C. A., Ayad, S. and Gilbert, R. T.
Chondrons from articular cartilage. V. Immunohistochemical evaluation of type VI collagen organisation in isolated chondrons by light, confocal and electron microscopy 1101-1110

Stephens, M., Kwan, A. P. L., Bayliss, M. T. and Archer, C. W.
Human articular surface chondrocytes initiate alkaline phosphatase and type X collagen synthesis in suspension culture 1111-1116

Curtenaz, S. and Peck, R. K.
A monoclonal antibody study of protein distribution in the membrane skeleton of the ciliate *Pseudomicrothorax* 1117-1125

Lin, H.-B., Harley, S. M., Butler, J. M. and Beevers, L.
Multiplicity of clathrin light-chain-like polypeptides from developing pea (*Pisum sativum* L.) cotyledons 1127-1137

Kok, J. W., Hoekstra, K., Eskelinen, S. and Hoekstra, D.
Recycling pathways of glucosylceramide in BHK cells: distinct involvement of early and late endosomes 1139-1152

Satiat-Jeunemaitre, B. and Hawes, C.
Redistribution of a Golgi glycoprotein in plant cells treated with Brefeldin A 1153-1166

Thyberg, J. and Moskalewski, S.
Disorganization of the Golgi complex and the cytoplasmic microtubule system in CHO cells exposed to okadaic acid 1167-1175

Creutz, C. E., Kambouris, N. G., Snyder, S. L., Hamman, H. C., Nelson, M. R., Liu, W. and Rock, P.
Effects of the expression of mammalian annexins in yeast secretory mutants 1177-1192

Russell, D. G., Xu, S. and Chakraborty, P.
Intracellular trafficking and the parasitophorus vacuole of *Leishmania mexicana*-infected macrophages 1193-1210

Thomas, L. A. and Yamada, K. M.
Contact stimulation of cell migration 1211-1214

Sims, J. R., Karp, S. and Ingber, D. E.
Altering the cellular mechanical force balance results in integrated changes in cell, cytoskeletal and nuclear shape 1215-1222

Dickson, G., Azad, A., Morris, G. E., Simon, H., Noursadeghi, M. and Walsh, F. S.
Co-localization and molecular association of dystrophin with laminin at the surface of mouse and human myotubes 1223-1233

Bauer, G. E., Balsamo, J. and Lilien, J.
Cadherin-mediated adhesion in pancreatic islet cells is modulated by a cell surface *N*-acetylgalactosaminyl phosphotransferase 1235-1241

Natali, P. G., Nicotra, M. R., Bigotti, A. and de Martino, C.
Localization of the α_6 and β_4 integrin subunits in normal human non-lymphoid tissues 1243-1247

Wolff, J. A., Dowty, M. E., Jiao, S., Repetto, G., Berg, R. K., Ludtke, J. J., Williams, P. and Slautterback, D. B.
Expression of naked plasmids by cultured myotubes and entry of plasmids into T tubules and caveolae of mammalian skeletal muscle 1249-1259

Chain, B. M., Leyshon-Sørland, K. and Siva-Jothy, M. T.
Haemocyte heterogeneity in the cockroach *Periplaneta americana* analysed using monoclonal antibodies 1261-1267

1992 Index of Authors and Titles 1269-1281

1992 Subject Index 1283-1310